

SEQUENCE LISTING

<110> YOKOYAMA, KEIICHI
NAKAMURA, NAMI
MIWA, TETSUYA
SEGURO, KATSUYA

<120> PROCESS FOR PRODUCING MICROBIAL TRANSGLUTAMINASE

<130> 0010-0937-0

<140> 09/109,063

<141> 1998-07-02

<150> JP 180010/1997

<151> 1997-07-04

<160> 62

<170> PatentIn Ver. 2.0

<210> 1

<211> 331

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial
Sequence:TRANSGLUTAMINASE

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Asp Ser Asp Asp Arg Val Thr Pro Pro Ala Glu Pro Leu Asp Arg Met
1 5 10 15

Pro Asp Pro Tyr Arg Pro Ser Tyr Gly Arg Ala Glu Thr Val Val Asn
20 25 30

Asn Tyr Ile Arg Lys Trp Gln Gln Val Tyr Ser His Arg Asp Gly Arg
35 40 45

Lys Gln Gln Met Thr Glu Glu Gln Arg Glu Trp Leu Ser Tyr Gly Cys
50 55 60

Val Gly Val Thr Trp Val Asn Ser Gly Gln Tyr Pro Thr Asn Arg Leu
65 70 75 80

Ala Phe Ala Ser Phe Asp Glu Asp Arg Phe Lys Asn Glu Leu Lys Asn
85 90 95

Gly Arg Pro Arg Ser Gly Glu Thr Arg Ala Glu Phe Glu Gly Arg Val
100 105 110

Ala Lys Glu Ser Phe Asp Glu Glu Lys Gly Phe Gln Arg Ala Arg Glu
115 120 125

Val	Ala	Ser	Val	Met	Asn	Arg	Ala	Leu	Glu	Asn	Ala	His	Asp	Glu	Ser
	130					135					140				
Ala	Tyr	Leu	Asp	Asn	Leu	Lys	Lys	Glu	Leu	Ala	Asn	Gly	Asn	Asp	Ala
145					150					155					160
Leu	Arg	Asn	Glu	Asp	Ala	Arg	Ser	Pro	Phe	Tyr	Ser	Ala	Leu	Arg	Asn
				165					170					175	
Thr	Pro	Ser	Phe	Lys	Glu	Arg	Asn	Gly	Gly	Asn	His	Asp	Pro	Ser	Arg
			180					185					190		
Met	Lys	Ala	Val	Ile	Tyr	Ser	Lys	His	Phe	Trp	Ser	Gly	Gln	Asp	Arg
		195					200					205			
Ser	Ser	Ser	Ala	Asp	Lys	Arg	Lys	Tyr	Gly	Asp	Pro	Asp	Ala	Phe	Arg
	210					215					220				
Pro	Ala	Pro	Gly	Thr	Gly	Leu	Val	Asp	Met	Ser	Arg	Asp	Arg	Asn	Ile
225					230					235					240
Pro	Arg	Ser	Pro	Thr	Ser	Pro	Gly	Glu	Gly	Phe	Val	Asn	Phe	Asp	Tyr
				245					250					255	
Gly	Trp	Phe	Gly	Ala	Gln	Thr	Glu	Ala	Asp	Ala	Asp	Lys	Thr	Val	Trp
			260					265					270		
Thr	His	Gly	Asn	His	Tyr	His	Ala	Pro	Asn	Gly	Ser	Leu	Gly	Ala	Met
		275					280					285			
His	Val	Tyr	Glu	Ser	Lys	Phe	Arg	Asn	Trp	Ser	Glu	Gly	Tyr	Ser	Asp
	290					295					300				
Phe	Asp	Arg	Gly	Ala	Tyr	Val	Ile	Thr	Phe	Ile	Pro	Lys	Ser	Trp	Asn
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<223> Description of Artificial Sequence:SYNTHETIC DNA

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<221> CDS

<222> (1)..(993)

<223> IDENTIFICATION METHOD: S

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 Asp Ser Asp Asp Arg Val Thr Pro Pro Ala Glu Pro Leu Asp Arg Met

48

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cca gat cca tat cgt cca tct tat ggt cgt gct gaa act gtt gtt aat	96			
Pro Asp Pro Tyr Arg Pro Ser Tyr Gly Arg Ala Glu Thr Val Val Asn				
20 25 30				
aat tat att cgt aaa tgg caa caa gtt tat tct cat cgt gat ggt cgt	144			
Asn Tyr Ile Arg Lys Trp Gln Gln Val Tyr Ser His Arg Asp Gly Arg				
35 40 45				
aaa caa caa atg act gaa gaa caa cgt gaa tgg ctg tct tat ggt tgc	192			
Lys Gln Gln Met Thr Glu Glu Gln Arg Glu Trp Leu Ser Tyr Gly Cys				
50 55 60				
gtt ggt gtt act tgg gtt aac tct ggt cag tat ccg act aac cgt ctg	240			
Val Gly Val Thr Trp Val Asn Ser Gly Gln Tyr Pro Thr Asn Arg Leu				
65 70 75 80				
gca ttc gct tcc ttc gat gaa gat cgt ttc aag aac gaa ctg aag aac	288			
Ala Phe Ala Ser Phe Asp Glu Asp Arg Phe Lys Asn Glu Leu Lys Asn				
85 90 95				
ggg cgt ccg cgt tct ggt gaa act cgt gct gaa ttc gaa ggt cgt gtt	336			
Gly Arg Pro Arg Ser Gly Glu Thr Arg Ala Glu Phe Glu Gly Arg Val				
100 105 110				
gct aag gaa tcc ttc gat gaa gag aaa ggc ttc cag cgt gct cgt gaa	384			
Ala Lys Glu Ser Phe Asp Glu Glu Lys Gly Phe Gln Arg Ala Arg Glu				
115 120 125				
gtt gct tct gtt atg aac cgt gct cta gag aac gct cat gat gaa tct	432			
Val Ala Ser Val Met Asn Arg Ala Leu Glu Asn Ala His Asp Glu Ser				
130 135 140				
gct tac ctg gat aac ctg aag aag gaa ctg gct aac ggt aac gat gct	480			
Ala Tyr Leu Asp Asn Leu Lys Lys Glu Leu Ala Asn Gly Asn Asp Ala				
145 150 155 160				
ctg cgt aac gaa gat gct cgt tct ccg ttc tac tct gct ctg cgt aac	528			
Leu Arg Asn Glu Asp Ala Arg Ser Pro Phe Tyr Ser Ala Leu Arg Asn				
165 170 175				
act ccg tcc ttc aaa gaa cgt aac ggt ggt aac cat gat ccg tct cgt	576			
Thr Pro Ser Phe Lys Glu Arg Asn Gly Gly Asn His Asp Pro Ser Arg				
180 185 190				
atg aaa gct gtt atc tac tct aaa cat ttc tgg tct ggt cag gat aga	624			
Met Lys Ala Val Ile Tyr Ser Lys His Phe Trp Ser Gly Gln Asp Arg				
195 200 205				
tct tct tct gct gat aaa cgt aaa tac ggt gat ccg gat gca ttc cgt	672			
Ser Ser Ser Ala Asp Lys Arg Lys Tyr Gly Asp Pro Asp Ala Phe Arg				
210 215 220				
ccg gct ccg ggt act ggt ctg gta gac atg tct cgt gat cgt aac atc	720			
Pro Ala Pro Gly Thr Gly Leu Val Asp Met Ser Arg Asp Arg Asn Ile				

25		230		235		240	
ccg cgt tct ccg act tct ccg ggt gaa ggc ttc gtt aac ttc gat tac	768						
Pro Arg Ser Pro Thr Ser Pro Gly Glu Gly Phe Val Asn Phe Asp Tyr							
		245		250		255	
ggt tgg ttc ggt gct cag act gaa gct gat gct gat aag act gta tgg	816						
Gly Trp Phe Gly Ala Gln Thr Glu Ala Asp Ala Asp Lys Thr Val Trp							
		260		265		270	
acc cat ggt aac cat tac cat gct ccg aac ggt tct ctg ggt gct atg	864						
Thr His Gly Asn His Tyr His Ala Pro Asn Gly Ser Leu Gly Ala Met							
		275		280		285	
cat gta tac gaa tct aaa ttc cgt aac tgg tct gaa ggt tac tct gac	912						
His Val Tyr Glu Ser Lys Phe Arg Asn Trp Ser Glu Gly Tyr Ser Asp							
		290		295		300	
ttc gat cgt ggt gct tac gtt atc acc ttc att ccg aaa tct tgg aac	960						
Phe Asp Arg Gly Ala Tyr Val Ile Thr Phe Ile Pro Lys Ser Trp Asn							
		305		310		315	320
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Thr Ala Pro Asp Lys Val Lys Gln Gly Trp Pro							
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 <223> Description of Artificial Sequence:SYNTHETIC DNA
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 <222> (87)..(1082)

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 Met Asp Ser Asp Asp Arg Val Thr Pro
 1 5
 cca gct gaa cca ctg gat cgt atg cca gat cca tat cgt cca tct tat 161
 Pro Ala Glu Pro Leu Asp Arg Met Pro Asp Pro Tyr Arg Pro Ser Tyr
 10 15 20 25
 ggt cgt gct gaa act gtt gtt aat aat tat att cgt aaa tgg caa caa 209
 Gly Arg Ala Glu Thr Val Val Asn Asn Tyr Ile Arg Lys Trp Gln Gln
 30 35 40
 gtt tat tct cat cgt gat ggt cgt aaa caa caa atg act gaa gaa caa 257
 Val Tyr Ser His Arg Asp Gly Arg Lys Gln Gln Met Thr Glu Glu Gln

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cgt	gaa	tgg	ctg	tct	tat	ggt	tgc	gtt	ggt	gtt	act	tgg	gtt	aac	tct	305		
Arg	Glu	Trp	Leu	Ser	Tyr	Gly	Cys	Val	Gly	Val	Thr	Trp	Val	Asn	Ser			
	60						65					70						
ggt	cag	tat	ccg	act	aac	cgt	ctg	gca	ttc	gct	tcc	ttc	gat	gaa	gat	353		
Gly	Gln	Tyr	Pro	Thr	Asn	Arg	Leu	Ala	Phe	Ala	Ser	Phe	Asp	Glu	Asp			
	75					80					85							
cgt	ttc	aag	aac	gaa	ctg	aag	aac	ggt	cgt	ccg	cgt	tct	ggt	gaa	act	401		
Arg	Phe	Lys	Asn	Glu	Leu	Lys	Asn	Gly	Arg	Pro	Arg	Ser	Gly	Glu	Thr			
	90				95					100					105			
cgt	gct	gaa	ttc	gaa	ggt	cgt	gtt	gct	aag	gaa	tcc	ttc	gat	gaa	gag	449		
Arg	Ala	Glu	Phe	Glu	Gly	Arg	Val	Ala	Lys	Glu	Ser	Phe	Asp	Glu	Glu			
				110					115					120				
aaa	gac	ttc	cag	cgt	gct	cgt	gaa	gtt	gct	tct	gtt	atg	aac	cgt	gct	497		
Lys	Gly	Phe	Gln	Arg	Ala	Arg	Glu	Val	Ala	Ser	Val	Met	Asn	Arg	Ala			
			125					130					135					
cta	gag	aac	gct	cat	gat	gaa	tct	gct	tac	ctg	gat	aac	ctg	aag	aag	545		
Leu	Glu	Asn	Ala	His	Asp	Glu	Ser	Ala	Tyr	Leu	Asp	Asn	Leu	Lys	Lys			
		140					145					150						
gaa	ctg	gct	aac	ggt	aac	gat	gct	ctg	cgt	aac	gaa	gat	gct	cgt	tct	593		
Glu	Leu	Ala	Asn	Gly	Asn	Asp	Ala	Leu	Arg	Asn	Glu	Asp	Ala	Arg	Ser			
	155					160					165							
ccg	ttc	tac	tct	gct	ctg	cgt	aac	act	ccg	tcc	ttc	aaa	gaa	cgt	aac	641		
Pro	Phe	Tyr	Ser	Ala	Leu	Arg	Asn	Thr	Pro	Ser	Phe	Lys	Glu	Arg	Asn			
					175					180					185			
ggt	ggt	aac	cat	gat	ccg	tct	cgt	atg	aaa	gct	gtt	atc	tac	tct	aaa	689		
Gly	Gly	Asn	His	Asp	Pro	Ser	Arg	Met	Lys	Ala	Val	Ile	Tyr	Ser	Lys			
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cat	ttc	tgg	tct	ggt	cag	gat	aga	tct	tct	tct	gct	gat	aaa	cgt	aaa	737		
His	Phe	Trp	Ser	Gly	Gln	Asp	Arg	Ser	Ser	Ser	Ala	Asp	Lys	Arg	Lys			
			205					210					215					
tac	ggt	gat	ccg	gat	gca	ttc	cgt	ccg	gct	ccg	ggt	act	ggt	ctg	gta	785		
Tyr	Gly	Asp	Pro	Asp	Ala	Phe	Arg	Pro	Ala	Pro	Gly	Thr	Gly	Leu	Val			
		220					225					230						
gac	atg	tct	cgt	gat	cgt	aac	atc	ccg	cgt	tct	ccg	act	tct	ccg	ggt	833		
Asp	Met	Ser	Arg	Asp	Arg	Asn	Ile	Pro	Arg	Ser	Pro	Thr	Ser	Pro	Gly			
	235					240					245							
gaa	ggc	ttc	gtt	aac	ttc	gat	tac	ggt	tgg	ttc	ggt	gct	cag	act	gaa	881		
Glu	Gly	Phe	Val	Asn	Phe	Asp	Tyr	Gly	Trp	Phe	Gly	Ala	Gln	Thr	Glu			
	250				255					260					265			
gct	gat	gct	gat	aag	act	gta	tgg	acc	cat	ggt	aac	cat	tac	cat	gct	929		
Ala	Asp	Ala	Asp	Lys	Thr	Val	Trp	Thr	His	Gly	Asn	His	Tyr	His	Ala			

270

275

280

:cg aac ggt tct ctg ggt gct atg cat gta tac gaa tct aaa ttc cgt 977
 pro Asn Gly Ser Leu Gly Ala Met His Val Tyr Glu Ser Lys Phe Arg
 285 290 295

iac tgg tct gaa ggt tac tct gac ttc gat cgt ggt gct tac gtt atc 1025
 asn Trp Ser Glu Gly Tyr Ser Asp Phe Asp Arg Gly Ala Tyr Val Ile
 300 305 310

acc ttc att ccg aaa tct tgg aac act gct ccg gac aaa gtt aaa cag 1073
 thr Phe Ile Pro Lys Ser Trp Asn Thr Ala Pro Asp Lys Val Lys Gln
 315 320 325

ggt tgg ccg taatgaaagc ttggatctct aattactgga cttcacacag 1122
 Gly Trp Pro
 330

actaagaatag acatatctta tattatgtga ttttgtgaca tttcctagat gtgaggtgga 1182

ggtgatgtat aaggtagatg atgacacctc acgccggacg catcgtggcc ggcatcaccg 1242

gcgccacagg tgcggttgct ggcgcctata tcgccgacat caccgatggg gaagatcggg 1302

ctcgceactt cgggctcatg agcgcttggt tcggcgtggg tatggtggca ggccccgtgg 1362

ccgggggact gttgggagcc atctccttgc atgcaccatt ccttgcgggc gcggtgctca 1422

acggcctcaa cctactactg ggctgcttcc taatgcagga gtcgcataag ggagagcgtc 1482

gagagcccg ctaatgagcg ggcttttttt tcagctg 1519

<210> 4

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<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:SYNTHETIC DNA

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<210> 5

<211> 41

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence:SYNTHETIC DNA

<400> 5

cgatcgtcag aatccatttt aaacctcctt actaatcgat g 41

<210> 6
 <211> 41
 <212> DNA
 <213> Artificial Sequence

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 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 6
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 <210> 7
 <211> 41
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 7
 gatctggcat acgatccagt gggtcagctg gtggagtaac a 41

 <210> 8
 <211> 41
 <212> DNA
 <213> Artificial Sequence

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 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 8
 cagatccata tcgtccatct tatgggtcgtg ctgaaactgt t 41

 <210> 9
 <211> 41
 <212> DNA
 <213> Artificial Sequence

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 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 9
 attaacaaca gtttcagcac gaccataaga tggacgatat g 41

 <210> 10
 <211> 41
 <212> DNA
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 <223> Description of Artificial Sequence:SYNTHETIC DNA

<400> 10
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<210> 11
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 <212> DNA
 <213> Artificial Sequence

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<400> 11
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<210> 12
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 <212> DNA
 <213> Artificial Sequence

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 <223> Description of Artificial Sequence:SYNTHETIC DNA

<400> 12
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<210> 13
 <211> 41
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence:SYNTHETIC DNA

<400> 13
 gccattcacg ttgttcttca gtcatttggt gtttacgacc a 41

<210> 14
 <211> 42
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence:SYNTHETIC DNA

<400> 14
 aatggctgtc ttatggttgc gttggtgtta cttgggttaa ca 42

<210> 15
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 <212> DNA
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 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 15
 agcttggttaa cccaagtaac accaacgcaa ccataagaca 40

 <210> 16
 <211> 38
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 16
 aattcggttaa ctctggtcag tatccgacta accgtctg 38

 <210> 17
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 <212> DNA
 <213> Artificial Sequence

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 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 17
 cgaatgccag acggttagtc ggatactgac cagagttaac g 41

 <210> 18
 <211> 49
 <212> DNA
 <213> Artificial Sequence

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 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 18
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 <210> 19
 <211> 49
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 19
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 <210> 20

<211> 35
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 20
 gtcgtccgcg ttctggtgaa actcgtgctg aattc 35

 <210> 21
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 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 21 35
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 <210> 22
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 <212> DNA
 <213> Artificial Sequence

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 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 22 48
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 <210> 23
 <211> 48
 <212> DNA
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 <220>
 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 23 48
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 <210> 24
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 <223> Description of Artificial Sequence:SYNTHETIC DNA

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42

<210> 25
<211> 39
<212> DNA
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<223> Description of Artificial Sequence:SYNTHETIC DNA

<400> 25
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<210> 26
<211> 45
<212> DNA
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<220>
<223> Description of Artificial Sequence:SYNTHETIC DNA

<400> 26
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<210> 27
<211> 50
<212> DNA
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<223> Description of Artificial Sequence:SYNTHETIC DNA

<400> 27
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<210> 28
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<212> DNA
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<223> Description of Artificial Sequence:SYNTHETIC DNA

<400> 28
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<210> 29
<211> 49
<212> DNA
<213> Artificial Sequence

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 223> Description of Artificial Sequence:SYNTHETIC DNA

 400> 29
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 <210> 30
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 <212> DNA
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 <223> Description of Artificial Sequence:SYNTHETIC DNA

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 <212> DNA
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 <223> Description of Artificial Sequence:SYNTHETIC DNA

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 <212> DNA
 <213> Artificial Sequence

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 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 32
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 <210> 33
 <211> 47
 <212> DNA
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 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 33
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 <210> 34

<211> 45
 <212> DNA
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 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 34
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 <210> 35
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 <212> DNA
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 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 35
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 <210> 36
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 <212> DNA
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 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 36
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 <210> 37
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 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 37
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 <210> 38
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 <223> Description of Artificial Sequence:SYNTHETIC DNA

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 <400> 41
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 <400> 42
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 <210> 43
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<220>
 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 43
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 <210> 44
 <211> 44
 <212> DNA
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 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 44
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 <210> 45
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 <212> DNA
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 <223> Description of Artificial Sequence:SYNTHETIC DNA

 <400> 45
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 <210> 46
 <211> 39
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FRAGMENT

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1 5

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